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ABSTRACT

This paper presents the Helsinki-Lappi project (HelLa) co-run by two Finnish universities: the University of Helsinki, and the University of Lapland. The general aim of the project is to study, develop, and assess how different training programs relate to educational use of information and communication technologies (ICT). The project is expected to contribute substantively to the national Virtual University Project of the Faculties of Education (KasVi). The specific aims are to analyze: how the pedagogical models of network-based education (NBE) can be seen in educational use of ICT programs; what kind of design, quality, and assessment principles can be elaborated in NBE; how a didactic network environment and NBE support media skills and the development of the individual and the community; and how national training programs in media education and educational use of ICT can be streamlined and made accessible to the international audience. The outcomes of the project will be models and didactic principles, which can be used in design and assessing NBE. (Contains 40 references.) (Author)

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Pedagogical Models in the Design and Assessment of Network-Based Education

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Abstract. This article presents the Helsinki-Lappi project (HelLa) co-run by two Finnish universities: the University of Helsinki, and the University of Lapland. The general aim of the project is to study, develop, and assess how different training programs relate to educational use of information and communication technologies (ICT). The project is expected to contribute substantively to the national Virtual University Project of the Faculties of Education (KasVi). The specific aims of the project are to analyze (i) how the pedagogical models of network-based education (NBE) can be seen in educational use of ICT programs; (ii) what kind of design, quality, and assessment principles can be elaborated in NBE (iii) how a didactic network environment and NBE support media skills and the development of the individual and the community; and (iv) how national training programs in media education and educational use of ICT can be streamlined and made accessible to the international audience. The outcomes of the project will be models and didactic principles, which can be used in design and assessing NBE.

Keywords: Network-based education (NBE), teaching-studying-learning (TSL) process; learning and studying environments; pedagogical models, designing and assessing principles; meaningful learning; information and communication technologies (ICT).

Introduction

The Finnish virtual university project (KasVi) aims at developing: 1) teacher education curricula in technological environments, 2) flexible training systems based on distance and flexi-mode teaching, 3) continuing teacher education, 4) qualitative ICT training programs, and 5) innovative pedagogy for NBE. The Universities of Helsinki and Lapland initiated the joint HelLa project in 2001 as part of the national KasVi project. The objective of the HelLa project is to study the following areas in 2001–2003: i) the pedagogical models of NBE in training programs of media education and educational use of ICT, ii) the further development of the principles and characteristics of designing and assessing NBE, iii) the support of NBE for the media skills of the individual and the community, and iv) the standardization and internationalization of national ICT training programs. This article examines the pedagogical models for NBE and the principles of design and assessment.

The Challenges of Assessment

Quality can be defined as a relation between the object and the aim of the study. The assessment of quality is always related to the situation; it is dependent on time, space and context. (Raivola 2000, 19-22.) In this article, the quality of NBE is primarily studied as the realization of the objectives of education. The quality of university

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education is always closely related to research. Research creates knowledge, and assessment, again, is deeply rooted in this knowledge obtained. Teaching based on research is seen as quality teaching. In this respect, quality is also understood as a corresponding principle. (Raivola 2000, 38–51.) In this study, quality is also defined as fundamental, goal-oriented, curriculum-oriented, meaningful, and profiting from the didactic principles of NBE.

When assessing NBE certain issues should be raised to fore: the operational context of NBE, communication and communalism, research into the role of the teachers and students, and modes of studying and teaching. (Ruokamo & Pohjolainen 1999; Tella et al. 2001.) According to Duffy and Jonassen (1992), learning and studying environments that have focused on users and their needs and a problem-oriented approach have been successful. (Vahtivuori 2001). It seems that NBE should be assessed at all levels; a study restricted to the surface level is insufficient. Thus, social perspectives, media culture, communication and mediation should be taken into account. (Tella et al. 2001.)

Pedagogical Models of Network-Based Education and Learning Theory

Based on pedagogical models of NBE and theoretical models of learning (e.g., Jonassen 1995; Ruokamo & Pohjolainen 1999; Tella et al. 2001), the HelLa project will study the didactic thinking involved in the teaching–studying–learning (TSL) process (Uljens 1997). We aim at presenting different pedagogical models that can be used to define the principles for designing and assessing NBE. Our study focuses especially on those pedagogical models that can be used to realize cooperative and communal modes of learning and studying. In this article, cooperative means that students work together and build their knowledge in cooperation with others, using their knowledge and skills beneficially (Jonassen 1995; Ruokamo & Pohjolainen 1998; 1999; 2000). Cooperative learning is based on the socio-constructivist perspective. By communal learning and studying, we refer to the philosophy of interaction and to the individual way of life. In communal studying, a common culture of activity and the process of work are strongly emphasized (Vygotsky 1934/1962; Panitz 1996; Tella 1998; Passi & Vahtivuori 1998; Hakkarainen et al. 1998).

Uljens (1997) emphasizes the teaching studying–learning process (TSL) as central for didactics. According to him, both teaching and learning are important but equally important is studying. (Cf. Kansanen et al. 2000.) Uljens (1997) argues that teaching cannot directly influence learning; rather, *teaching [affects] learning indirectly through the individual's study activity* (Uljens 1997, 39). For this reason, we also need to examine teaching, studying, and learning as equally important components. (Kynäslahti 2000, 25; Tella et al. 2001.) We argue that these concepts are the most beneficial way to organize and assess NBE.

The multi-dimensional model of media education is a conceptual framework for NBE, in which designing and assessing NBE are handled in an integrative way. In the model, the concepts of media education and the didactic TSL process are incorporated to communication and mediation. This model attempts to avoid the problems contained within earlier analytical criteria and the simplification of the complex realities involved in NBE. (Tella & Mononen-Aaltonen 2000.) Another model used is that of different uses of ICT, partly based on Goldsworthy's (1999) lenses of learning. It deals with four categories that examine the relationships between studying and technology. The four categories of the model are pedagogic, instrumental, communal, and communicative use of ICT. NBE profits most from several or all four different ways of using ICT being linked to the same educational program or to a TSL situation. (Vahtivuori & Masalin 2000; Vahtivuori 2001.)

Our study also focuses on the shared and divided expertise (Oatley 1990; Brown et al. 1993), which is based on research into the theory of learning, and the reciprocal teaching method (Palincsar & Brown 1984) in NBE (see also Hakkarainen et al. 2000). We have organized some experiments in this field in media education and NBE courses (Ruokamo & Syrjäkari 2001). In addition, we shall examine problem-based learning (Norman & Schmidt 1992) and meaningful learning (Ausubel 1968; Jonassen 1995). Experiences were promising for increasing quality of NBE. Research-focused teaching has also been used to study interaction and dialog in NBE. One of the key observations points to the significant role of the teacher in creating research-focused dialog. The meaning of social interaction in studying was also emphasized strongly alongside interaction which handled substance-specific issues. (Mononen-Aaltonen 1999; Lintula 1999). Observations of the NBE courses showed that groupwork software supports communal modes of learning and studying, different styles of studying and students' developing skills. (Cf. Sharan & Sharan 1992; Vahtivuori, Wager & Passi 1999.)

Some Principles for Designing and Assessing NBE

In the following, a few principles for designing and assessing NBE will be presented, based on the pedagogic models above. In terms of the TSL process, our key observation is that, as far as design and assessment go, the

same kinds of principles and characteristics apply to all the three components of TSL. (Ruokamo & Pohjolainen 1999; Tella et al. 2001.) In designing learning and studying environments, NBE and educational use of ICT can be understood as broad trends in which different tools and environments are used in many ways to support the TSL process. Networks are not to be understood simply as tools; rather, they can also serve as intelligent partners and new contexts (Jonassen 1995; Tella 1998). The entire context of NBE should be examined. The materials, the users' activity and needs and general didactic planning are crucial for the design and assessment of NBE (see also Bonk & Reynolds 1997). NBE also calls for user-oriented applications and customized models at the local level. In designing network-based environments, attention should be paid to their functionality to enable multi-level teaching and guidance. For meaningful and purposive learning and studying, we need, for instance, a fully operational tutoring and mentoring system in addition to the activity of the teacher. We will now present eleven characteristics of meaningful learning and studying and describe the corresponding didactic and learning theoretical network-based environment together with the desired teacher orientation.

1. Constructive and Cumulative. Students build new knowledge upon the basis of their earlier knowledge (de Corte 1995; Jonassen 1995; Lehtinen 1997; Ruokamo & Pohjolainen 1999; Mannisenmäki 2000; Nevgi & Tirri 2001). Well-organized, complicated skills for constructing and justifying information structures are emphasized in a learning and studying environment (Sinko & Lehtinen 1998; Manninen et al. 2000). The students' earlier knowledge controls the acquisition and interpretation of information (Lehtinen 1997). The teacher should construct learning and studying situations and contexts (Tella et al. 2001) in such a way that a student can build on his or her prior knowledge. Initial mapping can clarify the students' preparedness to receive information and skills. The learning and studying environment can be adapted to suit students' activities best and to fulfil their needs through the support of the teacher, tutor, and the peer group. (Manninen et al. 1999.)

2. Active and Self-Directed. The roles of the students and other members of the learning community are active. The students commit themselves to objective-oriented (Uljens 1997) and sensible processing, for which they are responsible. (Jonassen 1995; de Corte 1995; Lehtinen 1997; Ruokamo & Pohjolainen 1999; Mannisenmäki 2000; Nevgi & Tirri 2001.) A learning and studying environment enables a new kind of teacher-student relationship, which emphasizes communalism and the personal expertise of the students. (Sinko & Lehtinen 1998; Manninen et al. 2000.) Students can ask practical, informative questions, acquire information, and critically evaluate that information. The teacher creates and maintains students' activities with challenging and interesting settings for tasks shared with the students themselves. Students are encouraged to express new ideas and models of thinking. This way the entire community can see and profit from the "media traces" born during the process of learning (Sharan & Sharan 1992; Vahtivuori, Wager & Passi 1999; Mannisenmäki 2000; Tella et al. 2001).

3. Cooperative and Communal. Students work together and build new knowledge in cooperation with one another while benefiting from the knowledge and skills of others (de Corte 1995; Jonassen 1995; Lehtinen 1997; Ruokamo & Pohjolainen 1999; Mannisenmäki 2000; Nevgi & Tirri 2001). Communalism is embedded in dialogic thought (cf. Vygotsky 1934/1962; Vahtivuori, Wager & Passi 1999; Tella et al. 2001). Based on the theory of shared expertise, social interaction and communal modes of learning and studying are emphasized. The teacher is expected to maintain dialog and contact with the students in NBE (Passi & Vahtivuori 1998; Sinko & Lehtinen 1998; Ruokamo & Pohjolainen 1999; Manninen et al. 1999; 2000.)

4. Conversational and Interactive. A central element of the TSL process on the net is dialog (Jonassen 1995; Tella & Mononen-Aaltonen 1998; Mannisenmäki 2000). Dialog and dialogic communication, i.e., comprehensive understanding of and respect for one another as well as interaction and interactivity are at the core of NBE (Tella & Mononen-Aaltonen 1998). The quality of interaction has to be considered when an environment for NBE is being designed and assessed. Many different channels of communication should be used in learning and studying environments (Lintula 1999). The well-designed environment includes, among other things, common and shared conversation and working spaces in which documents can be worked on together.

5. Contextual and Situational. There are some problematic issues related to the physical environment the situation as well as to time and place. On a network, the place and the situation gain new forms. When teaching and studying on a net, it is necessary to consider the changes in these phenomena and how they affect designing and assessing NBE. (Vahtivuori 2001.) According to the features of meaningful learning and studying, learning tasks support meaningful solutions to the problems of the real world, or are simulated through certain case-specific or problem-based examples of the real world (Sharan & Sharan 1992; de Corte 1995; Jonassen 1995; Lehtinen 1997; Ruokamo & Pohjolainen 1998; Mannisenmäki 2000). Gaining experiences in NBE is at least as

important as in the face-to-face TSL process (Ackermann 1994; Boud & Feletti 1999; Vahtivuori 2001). The links with school are essential in the professional practices of working life and the rest of society (Sinko & Lehtinen 1998; Manninen et al. 2000). Among other things, simulations, videos, Internet links, implementations in the microworlds and applied problem-based situations are used in the learning and studying environment (Mannisenmäki 2000). Especially promising are on-line strategic and role games that include the principles and criteria linked to the community and experience (Vahtivuori 2001). In teaching we should find examples and connections to the real world and to the personal world of the students through questions touching on their interests. Through joint discussions, the teacher can perceive the external world and widen his or her own perspective substantively. (Sharan & Sharan 1992; Manninen et al. 1999.)

6. Transferable. Students know how to use their knowledge and skills in other situations and how to learn, adopt and benefit from them when learning new topics (Ruokamo & Pohjolainen 1999; Mannisenmäki 2000; Nevgi & Tirri 2001). A learning and studying environment supports emerging learning skills, problem solving skills and the skills of self-directed learning. (Sinko & Lehtinen 1998; Manninen et al. 2000.) A learning and studying environment includes cognitive tools, hypertext, professional systems, and databanks that underpin meaningful learning (Mannisenmäki 2000). The deep-going discussions between the teacher or the tutor and the different groups of students are fruitfully conducive to enabling the transfer of learnt knowledge to future situations and contexts (Manninen et al. 1999).

7. Goal-Oriented and Purposive. Students achieve a cognitive goal proactively. They can define and set objectives of their own (de Corte 1995; Jonassen 1995; Lehtinen 1997; Ruokamo & Pohjolainen 1999; Mannisenmäki 2000). The guidance and support given by the teacher are related to goal-oriented and purposive studying (Uljens 1997; Mononen-Aaltonen 1999). Self-guidance and a genuine attempt to learn also contribute to creating a learning and studying environment (Sinko & Lehtinen 1998; Manninen et al. 2000). A learning environment includes various tools for planning and monitoring one's learning process. Here, a teacher helps to support the materialization of his or her own curriculum (Manninen et al. 1999; Mannisenmäki 2000).

8. Guided. Learning itself as well as the learner's assessment of his or her own skill are promoted by the teacher and by the feedback and support from other students and actors (cf. Vygotsky 1934/1962; Nevgi & Tirri 2001). The need for guidance increases rather than decreases in NBE. On the other hand, the roles of the teacher and the student gain new dimensions and emphases in that in NBE they alternate and, at the same time, they enrich the TSL process. Students and teachers take turns in acting as guides and experts. (Tella et al. 2001.) The learning and studying environment has such tools for cooperation and discussion that enable feedback and support for both the individual and the studying community. The most important characteristics of the learning and studying environment are functional interaction, the opportunity to communicate informally, and to get immediate (synchronous) and delayed (asynchronous) feedback.

9. Individual. Humans have individual learning styles and strategies. Learning and studying are always influenced by the students' prior knowledge, concepts of learning, foci of interest and motivation (de Corte 1995; Lehtinen 1997). A learning and studying environment is basically individual (Nevgi & Tirri 2001), that is, it is never the same to all students. Learners can construct their own individualized interpretation of the challenges and opportunities posed by the environment. Each learner constructs his or her own learning and studying environment, where the immediate feedback given by the teacher supports the learner's individual process of handling and coping with information. (Lehtinen 1997, 20.) Here, the individualized guidance given by a teacher is of primary importance.

10. Reflective. Learners express what they have learnt and they examine the thinking processes and decisions required by the learning process (Jonassen 1995; Ruokamo & Pohjolainen 1999, Mannisenmäki 2000; Nevgi & Tirri 2001). Information retrieval and processing as well as the skills of critical assessment are emphasized in the modern learning environment (Sinko & Lehtinen 1998; Manninen et al. 2000). A learning environment includes the tools, such as diaries and the tools for a portfolio, necessary to support the assessment of one's learning and active output (Mannisenmäki 2000). The environment should also include the tools that the teacher can use when guiding students to assess their own studying process.

11. Abstract. Learning can be defined as the construction of new ideas at an abstract level; the development of theoretical ideas reaches from practical experience to the deeper level (Lehtinen 1997). The learning and studying environment enables students to review the socio-constructive process of abstract scientific theories and ideals (Lehtinen 1997). Here, the support given by the teacher is the more important the younger the students are.

Conclusions

The above-mentioned characteristics of NBE should be seen as flexible in their nature. Through them, it is possible to examine how different pedagogical models realize the principles of design and assessment and how pedagogical models can be further developed. New learning environments apparently demand new cultural skills and media skills that call for further practice. Teacher educators have the key position to develop the media skills of future teachers in educational use of ICT and in designing goal-oriented and purposive NBE. The design and assessment of NBE presuppose that the teacher and all users have sufficient media skills and an ability to use their skills for the benefit of the community and themselves. (Tella et al. 2001.)

This article has examined the objectives and pedagogical models of the HelLa project, the principles of didactics and the teaching–studying–learning process as applied to NBE, and, most importantly, the development of the characteristics of meaningful learning and studying as principles of designing and assessing learning environments. The aim has been to analyze certain didactic and learning-theoretical issues in order to develop NBE and educational use of ICT in the context of network environments.

To sum it up, the principles arising from the didactic models of NBE are in harmony with the principles emerging from the learning-theoretical models, e.g., the model of meaningful learning. In particular, both approaches underline the significance of contextuality, the importance of guidance, working together, dialog and social interaction. The training programs in educational use of ICT being implemented in Finland provide a versatile opportunity to experiment with different concretizations of NBE that can be tested against the principles of design and assessment. In the HelLa project, the aim is to summarize and further develop pedagogical models, on the one hand, and the principles of design and assessment, on the other.

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